CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
850 Marina Bay Parkway, Richmond, CA 94804

ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring Program

Monthly Marine Biotoxin Report

July 2012

Technical Report No. 12-20

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of July, 2012. Ranges of toxin concentrations are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA). Estimates are also provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. Summary information is also provided for any quarantine or health advisory that was in effect during the reporting period.

Please note the following conventions for the phytoplankton and shellfish biotoxin distribution maps: (i) All estimates for phytoplankton relative abundance are qualitative, based on sampling effort and percent composition; (ii) All toxin data are for mussel samples, unless otherwise noted; (iii) All samples are assayed for PSP toxins; DA analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA); (iv) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.

Southern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was not observed at any southern California sampling location (Figure 1) and PSP toxins were not detected in any shellfish samples collected in July (Figure 3).

Domoic Acid

Pseudo-nitzschia was observed along the

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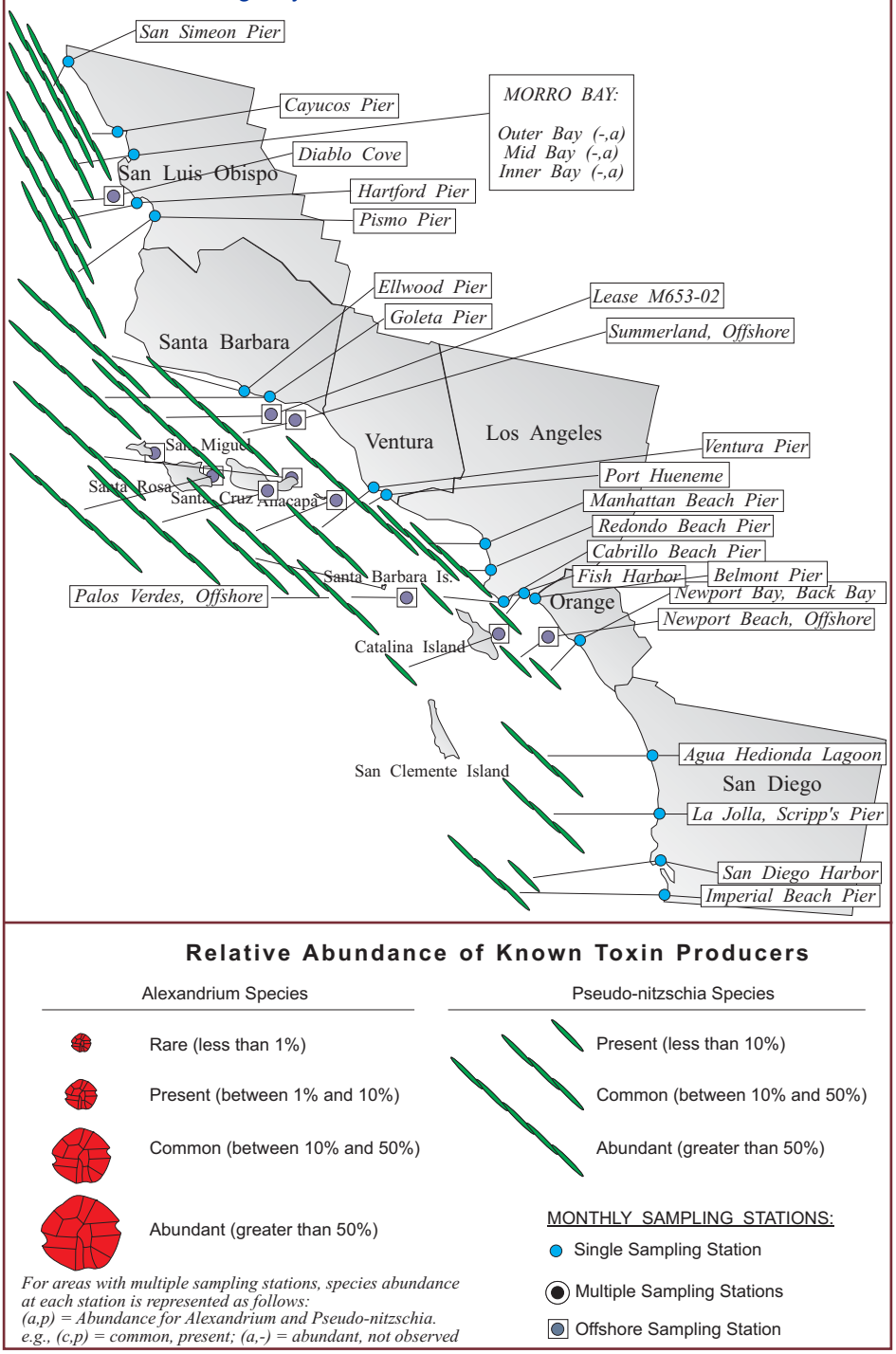
Figure 1. Distribution of toxin-producing phytoplankton in Southern California during July, 2012.



Relative Abundance of Known Toxin Producers

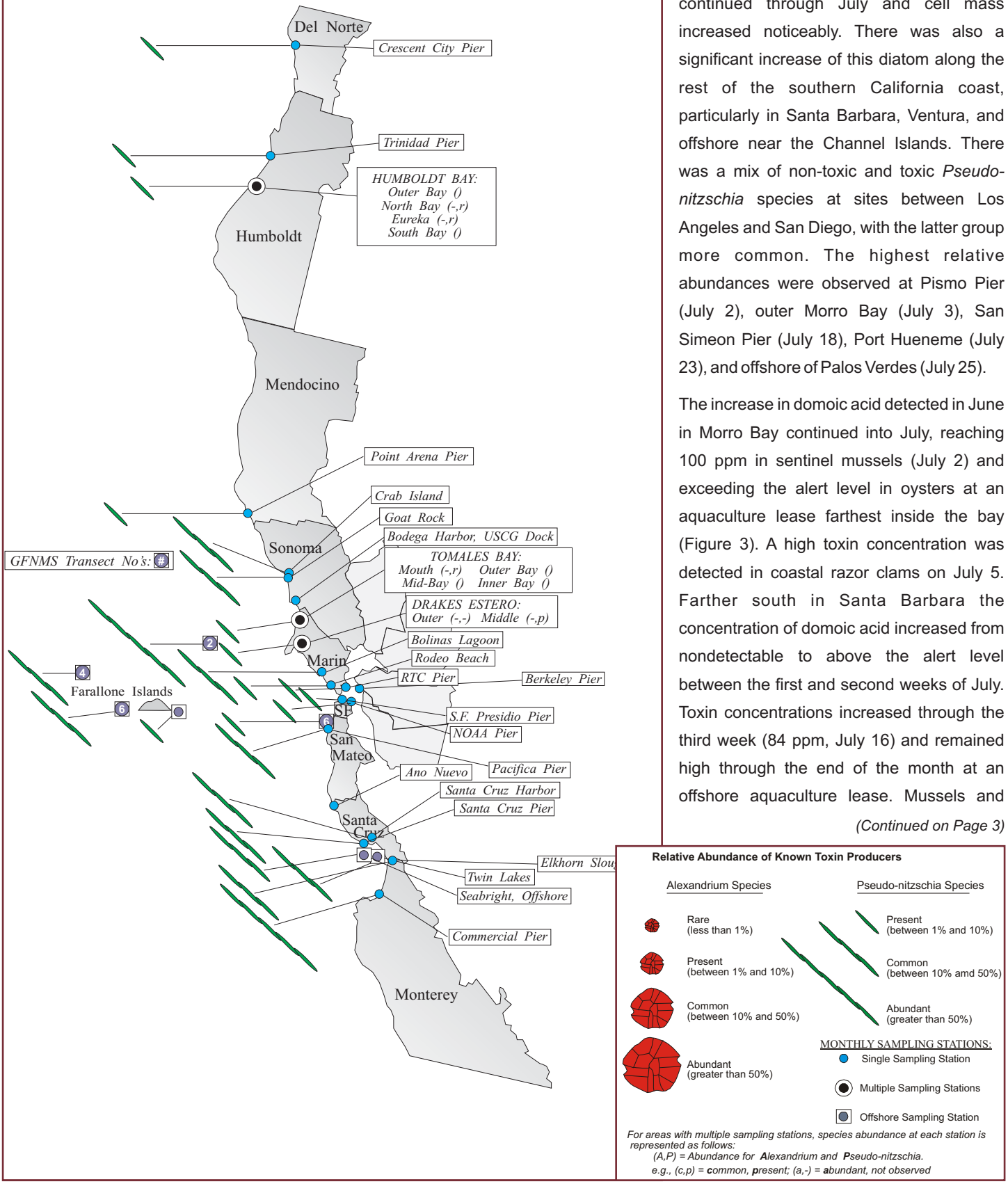
Alexandrium Species	Pseudo-nitzschia Species
Rare (less than 1%)	Present (less than 10%)
Present (between 1% and 10%)	Common (between 10% and 50%)
Common (between 10% and 50%)	Abundant (greater than 50%)
Abundant (greater than 50%)	

For areas with multiple sampling stations, species abundance at each station is represented as follows: (a,p) = Abundance for Alexandrium and Pseudo-nitzschia. e.g., (c,p) = common, present; (a,-) = abundant, not observed

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

Figure 2. Distribution of toxin-producing phytoplankton in Northern California during July, 2012.



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entire southern California coast in July (Figure 1). The high relative abundances observed along the San Luis Obispo coast continued through July and cell mass increased noticeably. There was also a significant increase of this diatom along the rest of the southern California coast, particularly in Santa Barbara, Ventura, and offshore near the Channel Islands. There was a mix of non-toxic and toxic *Pseudo-nitzschia* species at sites between Los Angeles and San Diego, with the latter group more common. The highest relative abundances were observed at Pismo Pier (July 2), outer Morro Bay (July 3), San Simeon Pier (July 18), Port Hueneme (July 23), and offshore of Palos Verdes (July 25).

The increase in domoic acid detected in June in Morro Bay continued into July, reaching 100 ppm in sentinel mussels (July 2) and exceeding the alert level in oysters at an aquaculture lease farthest inside the bay (Figure 3). A high toxin concentration was detected in coastal razor clams on July 5. Farther south in Santa Barbara the concentration of domoic acid increased from nondetectable to above the alert level between the first and second weeks of July. Toxin concentrations increased through the third week (84 ppm, July 16) and remained high through the end of the month at an offshore aquaculture lease. Mussels and

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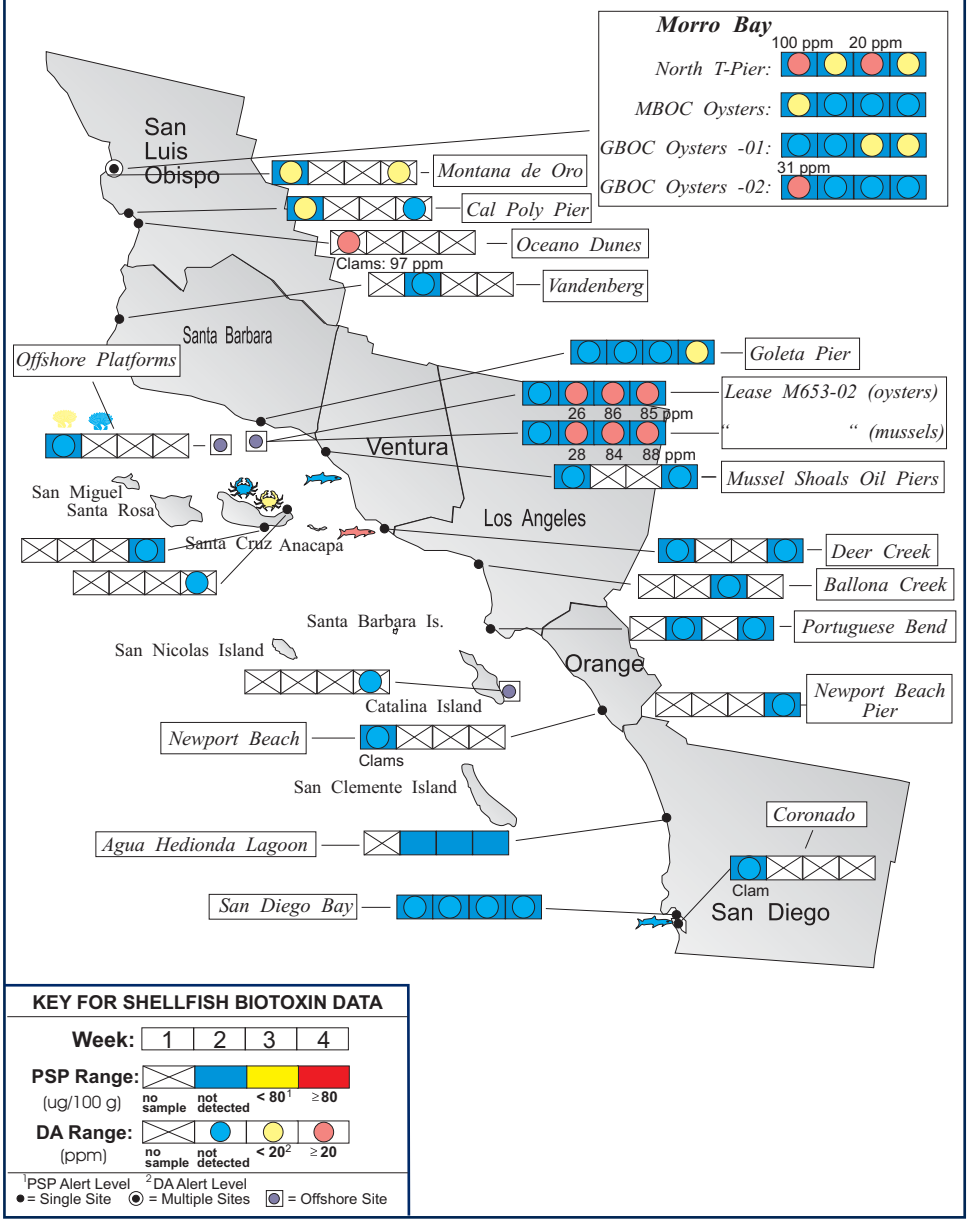
Figure 3. Distribution of shellfish biotoxins in Southern California during July, 2012.



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scallops from offshore oil platforms had low to nondetectable toxin levels, while gooseneck barnacles from an offshore buoy contained 19 ppm of domoic acid. Toxin levels were low or nondetectable in a variety of samples from Santa Cruz Island. Rock crabs collected near the island contained <2.5 ppm and 19 ppm of domoic acid (July 18). Anchovies caught off of Port Hueneme and sampled by the CDPH Food and Drug Branch contained 120 ppm of toxin.

Non-toxic Species

Pseudo-nitzschia's dominance between San Luis Obispo and Ventura precluded most other species. Some dinoflagellates became common by the end of the month at Santa Barbara sites but *Pseudo-nitzschia* remained most abundant. A greater diversity of diatoms (*Chaetoceros*, *Skeletonema*) and dinoflagellates (*Prorocentrum*, *Ceratium*) was observed between Los Angeles and San Diego.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was not observed at northern California sites during July (Figure 2). PSP toxins were not detected in any samples collected in July (Figure 4).

The Marine Biotoxin Monitoring and Control Program, managed by the California Department of Public Health, is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins and domoic acid.

The Phytoplankton Monitoring Program is a state-wide effort designed to detect toxin producing species of phytoplankton in ocean water before they impact the public. The phytoplankton monitoring and observation effort can provide an advanced warning of a potential toxic bloom, allowing us to focus sampling efforts in the affected area before California's valuable shellfish resources or the public health is threatened.

For More Information Please Call:
(510) 412-4635

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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Domoic Acid

Pseudo-nitzschia was observed at most sites along the northern California coast during July (Figure 2). This diatom increased in relative abundance at most locations, however the cell mass remained low. Applied Coastal Ecosystems Study (ACCESS) samples in June and July showed an increase in *Pseudo-nitzschia* offshore beyond the Farallone Islands. Domoic acid was not detected in any samples during July (Figure 4).

Non-toxic Species

Diatoms continued to dominate the northern California coast, with *Chaetoceros* ubiquitous.

QUARANTINES:

The annual mussel quarantine began on May 1. This quarantine prohibits the sport-harvesting of mussels along the entire California coastline, including all bays and estuaries. The annual quarantine does not apply to the certified commercial shellfish growing areas in California, which are monitored intensively throughout the year. In addition, routine coastal phytoplankton and biotoxin monitoring is maintained throughout the quarantine period. Special quarantines or health advisories may be issued for additional seafood species as warranted by increasing toxin levels.

Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can concentrate the PSP toxins in the viscera and in the dark parts of the siphon and can remain toxic for a long period of time. Persons taking scallops or clams, with the exception of razor clams, are advised to

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Figure 4. Distribution of shellfish biotoxins in Northern California during July, 2012.

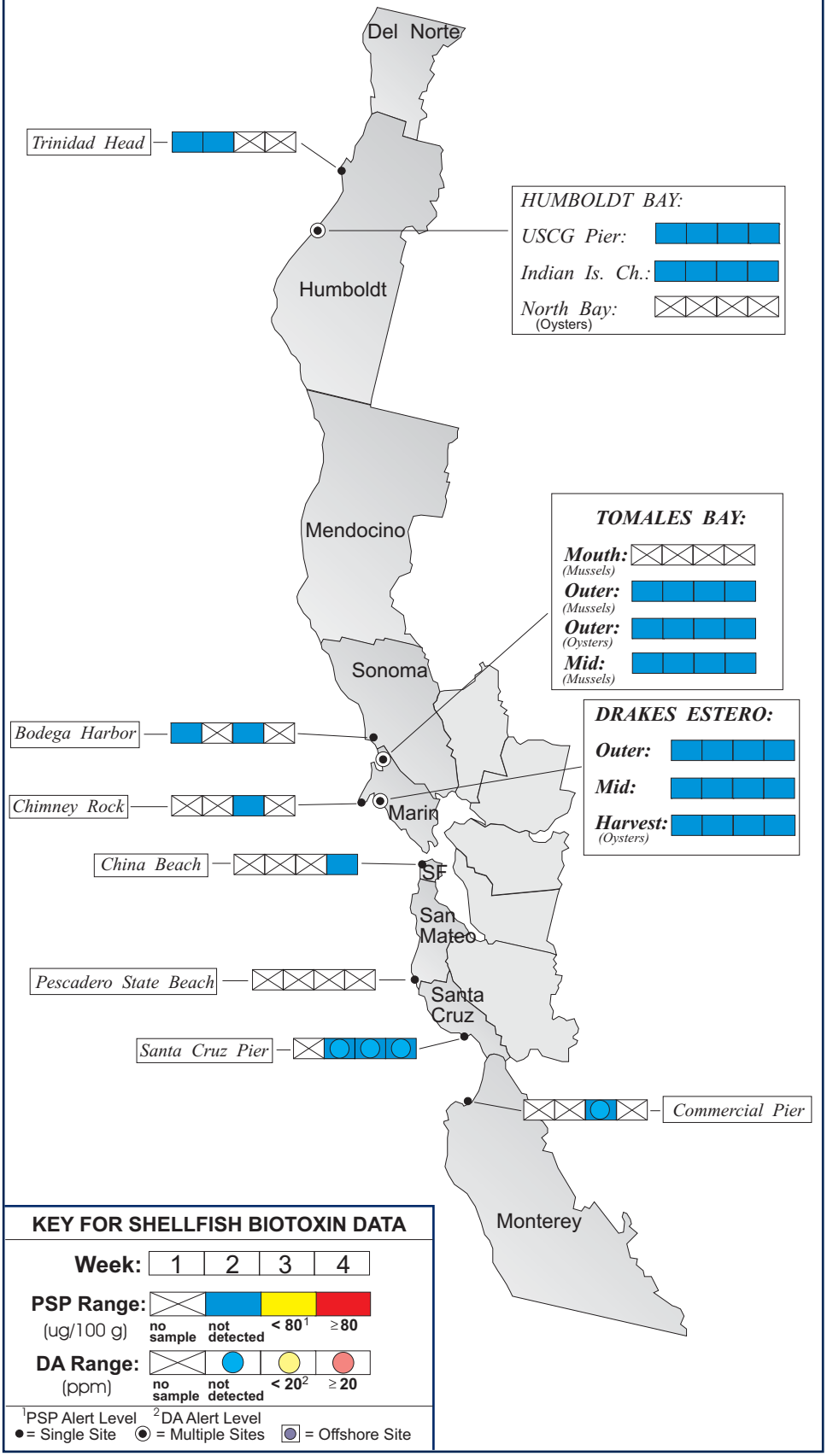

Table 1. California Marine Biotoxin Monitoring Program participants submitting shellfish samples during July, 2012.

COUNTY	AGENCY	#
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	10
	Humboldt County Environmental Health Department	1
	CDPH Volunteer (Georgianna Wood)	1
Mendocino	None Submitted	
Sonoma	CDPH Marine Biotoxin Program	2
Marin	Cove Mussel Company	4
	Drakes Bay Oyster Company	20
	Hog Island Oyster Company	4
	Marin Oyster Company	5
	CDPH Marine Biotoxin Program	1
San Francisco	San Francisco Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	U.C. Santa Cruz	3
Monterey	Monterey Abalone Company	1
San Luis Obispo	Grassy Bar Oyster Co.	15
	Morro Bay Oyster Company	10
	CDPH Volunteers (Bryce Halford, Ellen and Matt Lennon)	3
	Avila Beach Sea Life Cnter	2
Santa Barbara	Santa Barbara Mariculture Company	16
	U.C. Santa Barbara	11
	Vandenberg AFB	1
	Wild Planet Foods	2
Ventura	Ventura County Environmental Health Department	4
	CDPH Food and Drug Branch	3
Los Angeles	CDPH Volunteer (Cal Parsons)	1
	Los Angeles County Health Department	4
Orange	CDPH Volunteer (Steve Crooke)	1
	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	4
	CDPH Volunteer (Steve Crooke)	1
	U.S. Navy Marine Mammal Program	6

Table 2. Agencies, organizations and volunteers participating in marine phytoplankton sample collection during July, 2012.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	4
Humboldt	Coast Seafood Company	5
	Humboldt State University Marine Lab	5
	CDPH Volunteer (*Dustin Fredricey*)	1
Mendocino	CDPH Volunteer (*Marie de Santis*)	2
Sonoma	CDPH Marine Biotoxin Program	2
	WaterTreks EcoTours	6

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remove and discard the dark parts (i.e., the digestive organs or viscera). Razor clams (*Siliqua patula*) are an exception to this general guidance due to their ability to concentrate and retain domoic acid in the edible white meat as well as in the viscera.

PSP toxins affect the human central nervous system, producing a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms typically are followed by disturbed balance, lack of muscular coordination, slurred speech and difficulty swallowing. In severe poisonings, complete muscular paralysis and death from asphyxiation can occur.

Symptoms of domoic acid poisoning can occur within 30 minutes to 24 hours after eating toxic seafood. In mild cases, symptoms of exposure to this nerve toxin may include vomiting, diarrhea, abdominal cramps, headache and dizziness. These symptoms disappear completely within several days. In severe cases, the victim may experience excessive bronchial secretions, difficulty breathing, confusion, disorientation, cardiovascular instability, seizures, permanent loss of short-term memory, coma and death.

Any person experiencing any of these symptoms should seek immediate medical care. Consumers are also advised that neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in the viscera of seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be consumed. Contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.

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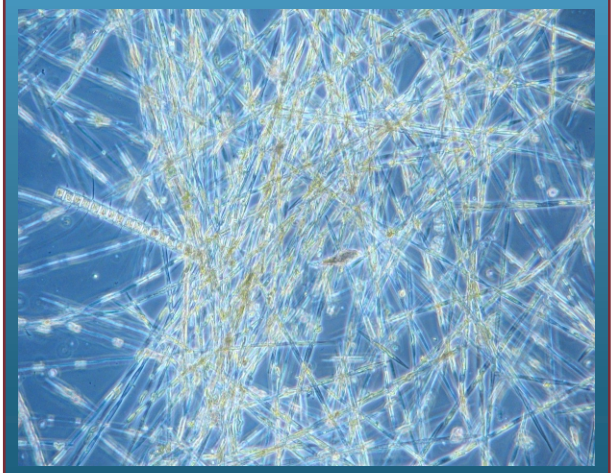
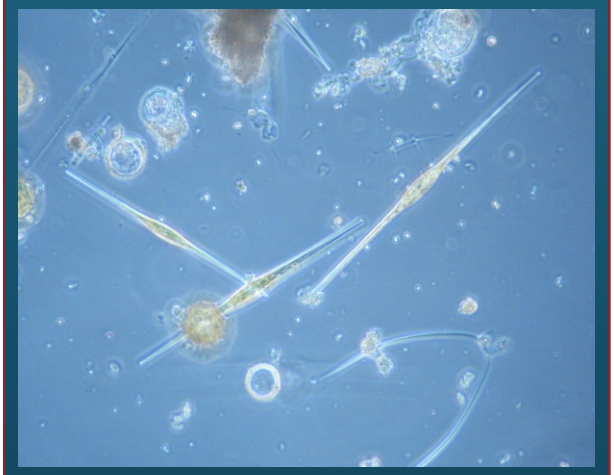
Marin	Drakes Bay Oyster Company	10
	CDPH Volunteer (*Brent Anderson*)	5
	SFSU, Romberg Tiburon Center	2
	CDPH Marine Biotoxin Program	3
	Applied California Current Ecosystems Studies (ACCESS)	2
	Golden Gate National Recreation Area	1
Contra Costa	None Submitted	
Alameda	City of Berkeley	1
San Francisco	CDPH Volunteer (*Eugenia McNaughton*)	2
	Exploratorium	4
	ACCESS	2
	San Francisco Bay Whale Watching Company	1
San Mateo	The Marine Mammal Center (*Stan Jensen*)	4
	U.C. Santa Cruz	1
Santa Cruz	San Lorenzo Valley High School	3
	California Department of Parks and Recreation	4
	U.C. Santa Cruz	4
Monterey	Friends of the Sea Otter (*Janis Chaffin*)	4
	Monterey Abalone Company	4
San Luis Obispo	Friends of the Sea Otter (*Kelly Cherry, Al Guild*)	4
	Grassy Bar Oyster Company	5
	Morro Bay National Estuary Program	2
	Monterey Bay National Marine Sanctuary	3
	Tenera Environmental	3
	The Marine Mammal Center (*P.J. Webb, Tim Lytsell*)	5
Santa Barbara	CDPH Volunteer (*Sylvia Short*)	5
	Santa Barbara Mariculture Company	9
	U.C. Santa Barbara	4
	Tole Mour	6
	National Park Service	1
	U.C. Santa Barbara	5
Ventura	CDPH Volunteer (*Fred Burgess*)	5
	National Park Service	2
	Ventura County Environmental Health Department	2
Los Angeles	Los Angeles County Sanitation District	4
	CDPH Volunteer (*Cal and Sadie Parsons*)	2
	Los Angeles County Health Department	3
	Tole Mour	5
	Southern California Marine Institute	1
	Long Beach Marine Institute	1
Orange	Orange County Health Care Agency	1
	California Department of Fish and Game	4
San Diego	Carlsbad Aquafarms, Inc.	2
	Scripps Institute of Oceanography	5
	Tijuana River National Estuary Research Reserve	4
	U.S. Navy Marine Mammal Program	4

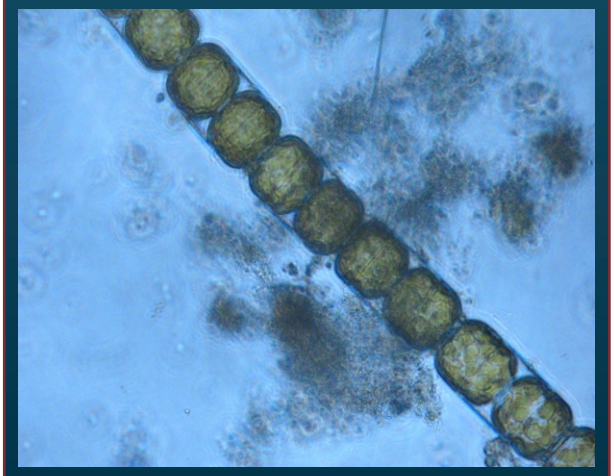
PHYTOPLANKTON GALLERY



A typical view of what a bloom of Pseudo-nitzschia lloks like under the microscope.



The pennate diatom Cylindrotheca (formerly Nitzschia) occurs occasionally in our samples.



The chain-forming diatom Melosira is often seen in calmer areas such as Bolinas Lagoon.